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## ULTRAVIOLET DISINFECTION AT ARMY WASTEWATER TREATMENT FACILITIES

### 1. INTRODUCTION

Application of chlorine for the control of disease producing organisms has been commonly practiced since the early 1900's. In recent years, attention has been given to the disadvantages of chlorine as a wastewater disinfectant since chlorination of wastewater can cause environmental and health problems. Chlorinated effluent produces residuals which are toxic to aquatic life<sup>(10,1,2)</sup> and some by-products of chlorination such as chlorinated hydrocarbons may be carcinogenic<sup>(10,3)</sup>. Also, chlorination is less effective in virus destruction than in killing bacteria<sup>(10,4)</sup>. Since chlorine-induced toxicity is becoming a serious environmental concern by the individual States with regard to the discharge of chlorinated wastewater into the surface waters, the priority given to chlorine as a wastewater disinfectant at Army installations is also being questioned.

Several methods have been developed to eliminate this toxicity problem. Residual chlorine and some chlorinated compounds have been removed from disinfected secondary effluent prior to discharge. Alternative chemical treatments have been employed involving chlorine dioxide, sulfur dioxide, iodine, bromine, and bromine chloride<sup>(10,5,6)</sup>. Use of ozone as a disinfectant has shown some promise, since ozone, in terms of biocidal efficiency is more potent than chlorine, chlorine dioxide, or chloramine<sup>(10,7)</sup>. Recently, increased attention has been given to ultraviolet disinfection. Ultraviolet radiation has been shown to be a practical, safe, effective, and cost effective disinfection alternative to both chlorination/dechlorination and ozonation of wastewater effluent<sup>(10,8,9)</sup>. Petrasek, et. al.<sup>(31)</sup> concluded that UV radiation presents a viable disinfection process for secondary effluent and that an activated sludge effluent can be adequately disinfected with UV radiation to comply with disinfection standards. Ultraviolet disinfection does not require highly toxic chemicals, does not produce harmful by-products, and requires only short contact time and low energy. Improved technology has made UV disinfection increasingly reliable.